



A.D. 1855 N° 1195.

SPECIFICATION

OF

WILLIAM SIMSON YOUNG.

STEAM BOILER FURNACES.

LONDON:

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1855.



A.D. 1855 N^o 1195.

Steam Boiler Furnaces.

LETTERS PATENT to William Simson Young, of Leith, in the County of Midlothian, North Britain, Merchant, for the Invention of “**IMPROVEMENTS IN STEAM BOILER FURNACES, AND IN THE PREVENTION OF SMOKE THEREIN.**”

Sealed the 10th August 1855, and dated the 26th May 1855.

PROVISIONAL SPECIFICATION left by the said William Simson Young at the Office of the Commissioners of Patents, with his Petition, on the 26th May 1855.

I, WILLIAM SIMSON YOUNG, of Leith, in the County of Midlothian, North
5 Britain, Merchant, do hereby declare the nature of the said Invention for
“**IMPROVEMENTS IN STEAM BOILER FURNACES, AND IN THE PREVENTION OF SMOKE
THEREIN,**” to be as follows, that is to say:—

This Invention relates to the arrangement and construction of steam boiler
furnaces in such a manner as to effect the entire combustion of the smoke,
10 whilst at the same time the furnace is rendered peculiarly efficient and economical in the consumption of fuel. The Invention is applicable to most kinds of steam boiler furnaces, whether such furnaces are external to the boiler or inside of it, being, however, more conveniently adapted to boilers with internal furnaces. According to one modification, two furnaces are employed, and are

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made to communicate with a single smoke chamber at their back ends, the heated gases being conveyed thence in any convenient manner.

In carrying out the Invention, the the two furnaces must be fired alternately, so that the green smoke of the one may be mingled with the smokeless products of the other. The smoke chamber is supplied with heated air by means of 5 any convenient number of pipes passing through the water spaces of the boiler, and opening at one end into the smoke chamber, whilst at the other end they communicate with the atmosphere, and are fitted with any suitable valve for regulating the supply of air. The passing of the air pipes through the water spaces is a very convenient arrangement in practice, and the pipes are thereby 10 protected from being injured by the heat.

In boilers where more than two furnaces are employed, as in marine boilers, for example, the furnaces may be coupled together in pairs, each pair communicating with a single smoke chamber, the furnaces being fired alternately; or three or more furnaces may be made to communicate with a single smoke 15 chamber, the furnaces being fired in rotation. The supply of air may either be made regular, by a permanent adjustment of the induction valve or valves, or it may be increased at the periods of firing by self-acting mechanism, which will cause it to be gradually diminished as the production of green smoke from the newly supplied fuel is lessened. 20

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said William Simson Young in the Great Seal Patent Office on the 26th November 1855.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, WILLIAM SIMSON YOUNG, of Leith, in the County of Midlothian, North Britain, Mer- 25 chant, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Twenty-sixth day of May, in the year of our Lord One thousand eight hundred and fifty-five, in the eighteenth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the 30 said William Simson Young, Her special license that I, the said William Simson Young, my executors, administrators, and assigns, or such others as I, the said William Simson Young, my executors, administrators, or assigns, should at any time agree with, and no others, from time to time and at all

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times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for “**IMPROVEMENTS IN STEAM BOILER FURNACES, AND IN THE PREVENTION OF SMOKE THEREIN,**”
5 upon the condition (amongst others) that I, the said William Simson Young, by an instrument in writing under my hand and seal, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the
10 date of the said Letters Patent.

NOW KNOW YE, that I, the said William Simson Young, do hereby declare the nature of my said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement in writing, reference being had to the accompanying Drawings, and
15 to the letters and figures marked thereon, that is to say:—

My said Invention relates to the arrangement and construction of steam boiler furnaces in such a manner as to effect the entire or nearly entire combustion of the smoke, whilst at the same time the furnace is rendered peculiarly efficient and economical in the consumption of fuel. The Invention
20 is applicable to most kinds of steam boiler furnaces, whether such furnaces are external to the boiler or inside of it, being, however, more conveniently adapted to boilers with internal furnaces. According to one modification, two furnaces are employed, and are made to communicate with a single smoke chamber at their back ends, the heated gases being conveyed thence in any
25 convenient manner.

In carrying out the Invention, the two furnaces must be fired alternately, so that the green smoke of the one may be mingled with the smokeless products of the other. The smoke chamber is supplied with heated air by means of any convenient number of pipes passing through the water spaces of the boiler, and
30 opening at one end into the smoke chamber, whilst at the other end they communicate with the atmosphere, and may be fitted with any suitable valve for regulating the supply of air. The passing of the air pipes through the water spaces is a very convenient arrangement in practice, and the pipes are thereby protected from being injured by the heat.

35 In boilers where more than two furnaces are employed, as in marine boilers, for example, the furnaces may be coupled together in pairs, each pair communicating with a single smoke chamber, the furnaces being fired alternately; or three or more furnaces may be made to communicate with a single smoke

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chamber, the furnaces being fired in rotation. The supply of air may either be made regular, by a permanent adjustment of the induction valve or valves, or it may be increased at the periods of firing by self-acting mechanism, which will cause it to be gradually diminished as the production of green smoke from the newly supplied fuel is lessened. 5

And in order that my said Invention may be properly understood, I shall now proceed to describe the explanatory Figures on the Sheet of Drawings hereunto attached.

Figure 1 on the Sheet of Drawings is a front end view, half in transverse section and half in elevation, and Figure 2 is a vertical longitudinal section, of 10 a cylindrical stationary steam boiler and furnaces, shewing one convenient mode of working out my Invention in practice. A convenient mode of applying my said Invention to marine steam boilers is shewn in Figures 3, 4, and 5, on the same Sheet of Drawings; Figure 3 being a front end view, half in transverse section and half in elevation; Figure 4, a vertical longitudinal section; and 15 Figure 5, a horizontal section; each half of it being taken at a different level. The stationary boiler, represented in Figures 1 and 2, is cylindrical in form with flat vertical ends, and is fitted with two internal furnaces A, B. The grate bars of these furnaces extend backwards in parallel cylindrical flues as far as the bridge C, Figure 2, behind which is the mixing or combustion chamber D for 20 the gases. This chamber at its front or bridge end is of sufficient width to join both furnaces A, B, but it is conical in form, gradually diminishing in width to the line E, where it becomes circular in transverse section, and coincides with the cylindrical flue F, extending to the back end of the boiler, and communicating with the flues G surrounding the boiler, and formed in its brickwork 25 casing H. The gases from the two furnaces thus become commingled in the chamber D; and to assist in effecting their thorough combustion, I introduce a supply of atmospheric air into this chamber. For this purpose, pipes I are passed through from the front of the boiler to the chamber D, and these pipes being surrounded by the water in the boiler, the air entering through them is to 30 a certain extent heated by the water, so as to have less tendency to reduce the temperature of the gases in the chamber D. I find in practice that a regular and uniform supply of atmospheric air answers the end in view sufficiently well, and if the pipes I are of a size justly proportionate to the requirements of the furnace, no valvular or supply regulating mechanism need be fitted to them; 35 but where found necessary or desirable, any suitable arrangement of valves may be used, either for adjusting a regular supply, or for admitting more air at one time than at another, as, for example, when fresh fuel is put into either furnace.

FIG. 1.

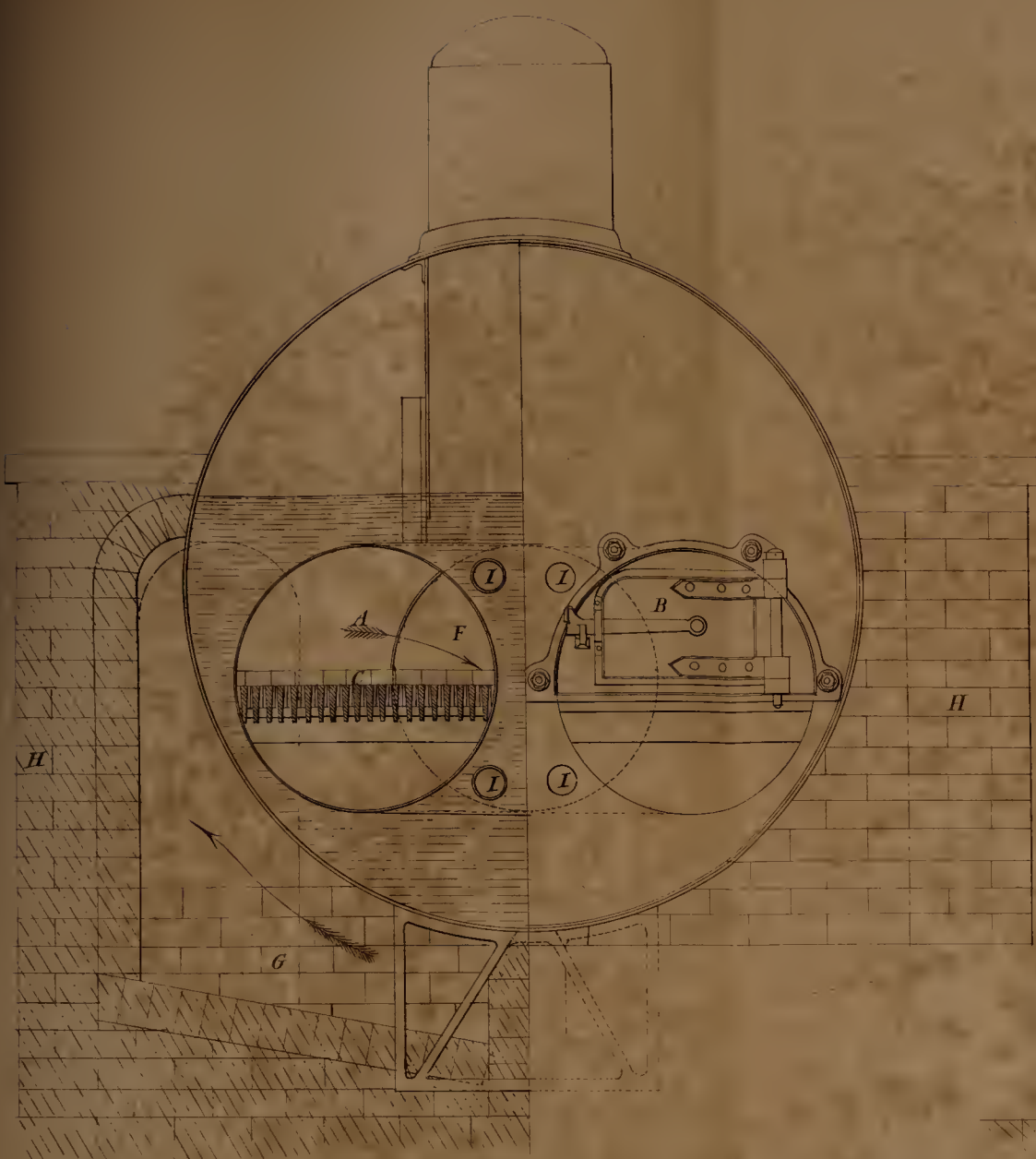


FIG. 2.

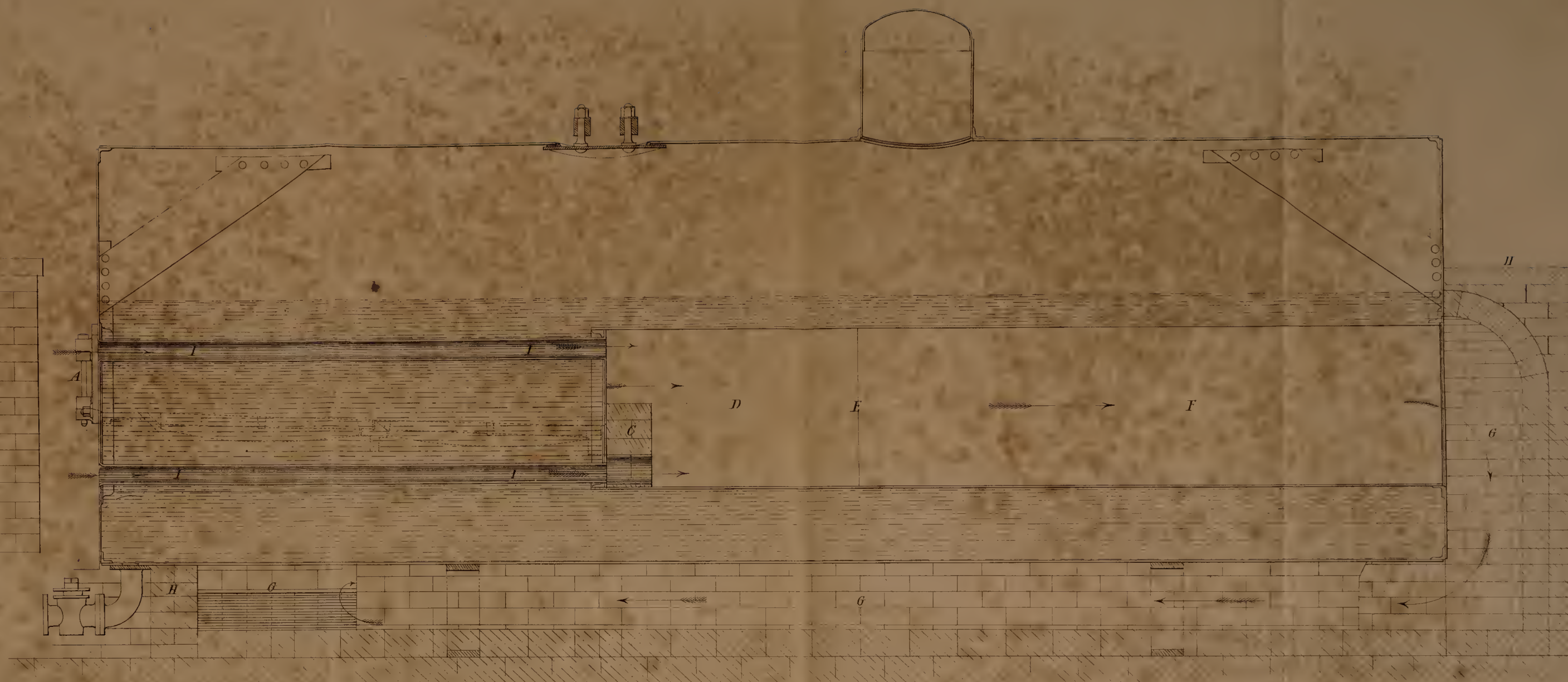


FIG. 3.

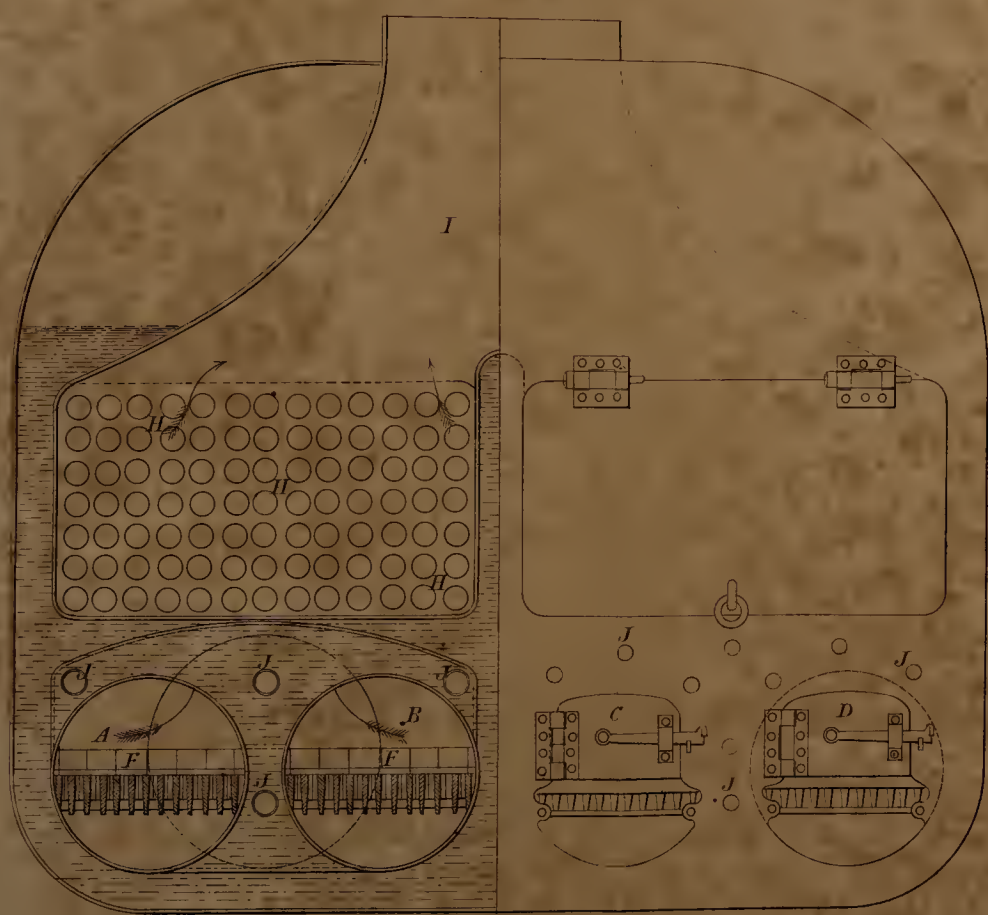


FIG. 4.

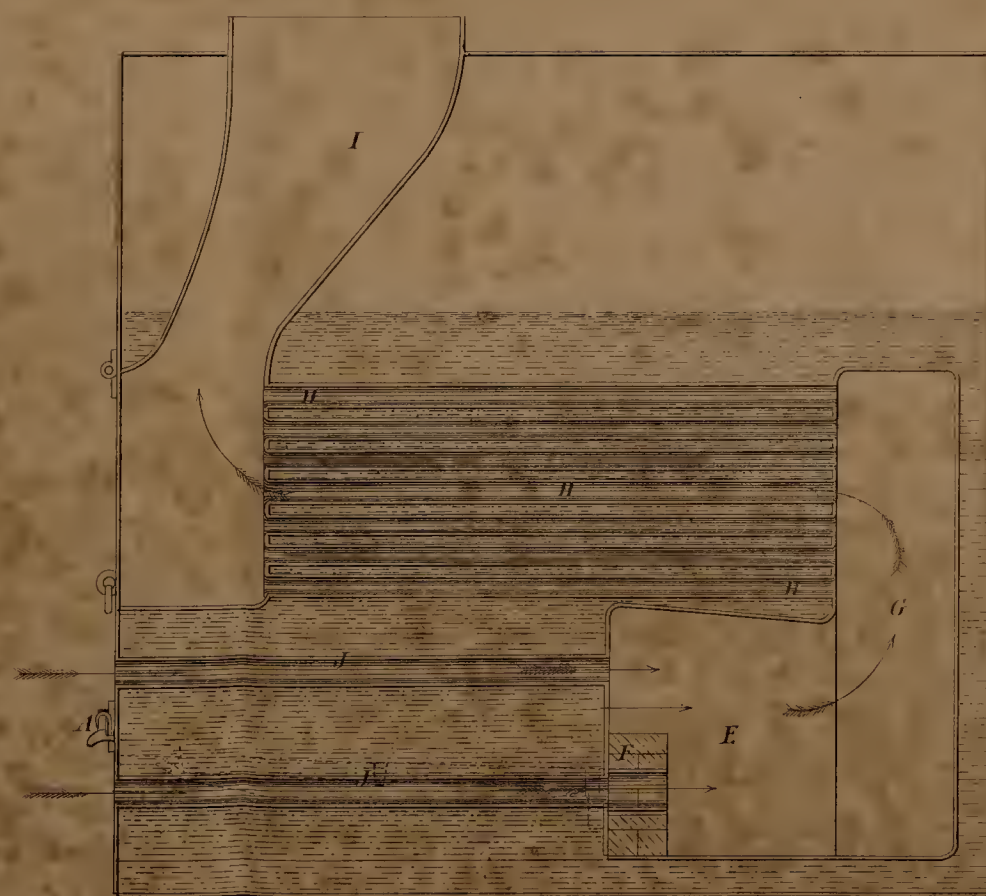
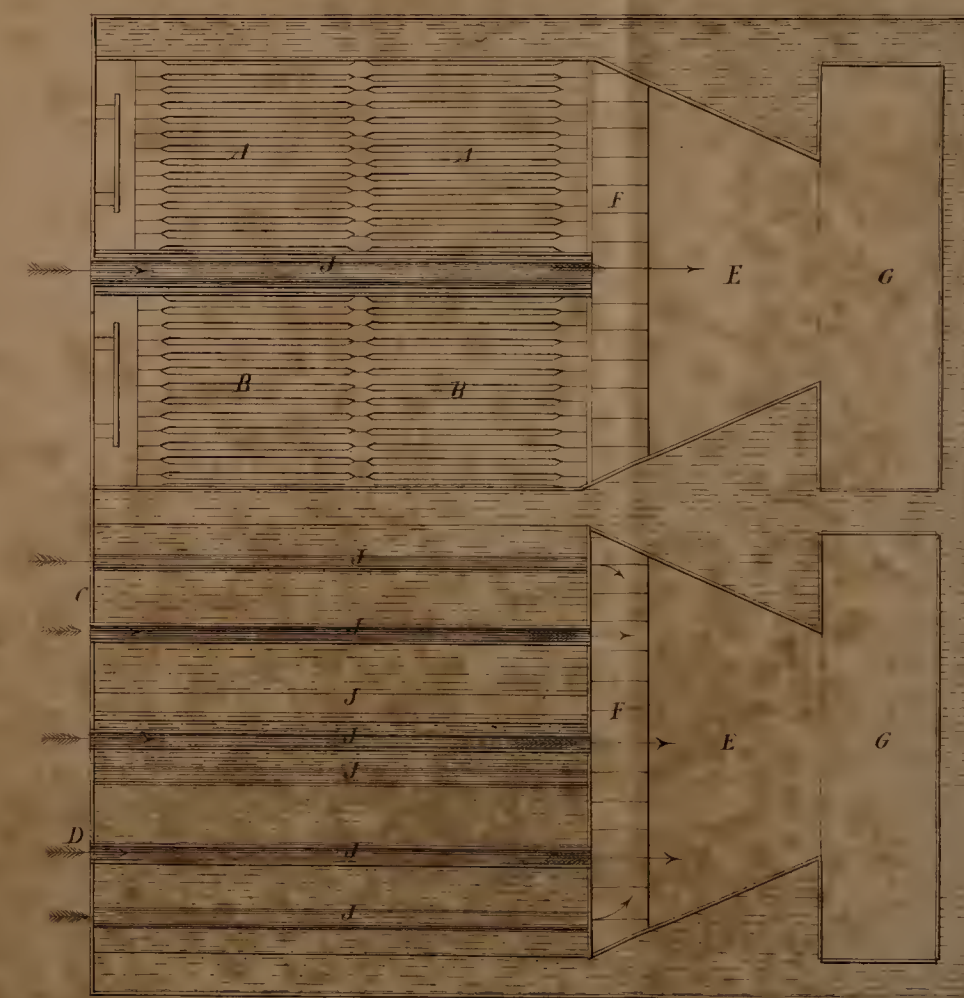


FIG. 5.



Scale for Figs 1 & 2.

Inches 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 Feet

Scale for Figs 3, 4 & 5.

Inches 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 Feet

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In the marine boilers represented in Figures 3, 4, and 5, on the Sheet of Drawings hereunto attached, four furnaces A, B, C, D, are shown, and there are two combustion or mixing chambers E immediately in the rear of the bridges F, each chamber communicating with two of the furnaces. The same routine of firing is to be observed with each pair of these furnaces as with the single pair already described. The chambers E become contracted as they recede, and they communicate with the upward flues G, from which flues the gases pass back towards the front of the boiler over the furnaces through the tubes H, finally passing off up to the funnel at I. The arrangements for supplying atmospheric air to the mixing chambers E are similar to those adopted in the stationary boiler already described. A series of tubes J are passed from the front end of the boiler through the water spaces between and over the furnaces to the mixing chambers E, the bridges F being perforated to admit the air from such tubes as open behind it. These air tubes may be variously proportioned, either few in number, and of comparatively large transverse sectional area, as represented upon the left-hand side of Figure 3, or many, and of proportionally smaller transverse sectional area, as represented upon the right-hand side of Figure 3. The upper half of the horizontal section Figure 5 is taken through the furnaces, and shows the air tube J passing through the central water space between the furnaces A and B. The lower half of this section is taken above the furnaces C, D, and shows some of the smaller air tubes in longitudinal section. These air tubes may be fitted into the boiler according to the ordinary mode of fixing flue tubes in boilers, or in any convenient way.

Having now described and particularly ascertained the nature of my said Invention, and the manner in which the same is or may be used or carried into effect, I may observe, in conclusion, that I do not confine or restrict myself to the precise details or arrangements which I have had occasion to describe, or refer to, as many variations may be made therefrom without deviating from the principles or main features of my Invention; but what I consider to be novel and original, and therefore claim as the Invention secured to me by the herein-before in part recited Letters Patent, is,—

First, the system or mode of effecting the combustion of smoke in steam boiler furnaces, by arranging two or more furnaces in combination with a single mixing chamber or main flue to each two or more furnaces, such furnaces being fired alternately or in rotation, and such mixing chambers or main flues being supplied with atmospheric air by tubes passing through the boiler or boilers, as herein-before described.

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Second, the application and use in steam boilers, where two or more furnaces communicate with a single mixing chamber or main flue, of air tubes passing through the boiler or boilers, and admitting atmospheric air into such chamber or main flue, as herein-before described.

In witness whereof, I, the said William Simson Young, have hereunto 5
set my hand and seal, this Twenty-first day of November, One thousand
eight hundred and fifty-five.

W^M S. YOUNG. (L.S.)

LONDON :

Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty. 1855.